PATENT APPLICATION

THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: Elliot J. Strauss

Application No.: 10/760,992 Examiner: Cuong V. Luu

Filed: January 20, 2004 Docket No.: OMNZ 2 00014

For: **MODELING METHOD AND PROGRAM FOR IN-MOLD COATING AN INJECTION MOLDED THERMOPLASTIC ARTICLE**

BRIEF ON APPEAL

Appeal from Group 2128

Erik J. Overberger, Esq., Reg. No. 48,556
FAY SHARPE LLP
1100 Superior Avenue – Seventh Floor
Cleveland, Ohio 44114-2579
Telephone: (216) 861-5582
Attorneys for Appellants

CERTIFICATE OF MAILING OR TRANSMISSION	
I hereby certify that this correspondence (and any item referred to herein as being attached or enclosed) is (are) being ☐ deposited with the United States Postal Service as First Class Mail, addressed to: Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below. ☒ transmitted to the USPTO by electronic transmission via EFS-Web on the date indicated below.	
Express Mail Label No.:	Signature: Audrey M. Dragony
Date: October 14, 2008	Name: Audrey M. Dragony

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application is OMNOVA Solutions Inc., by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 014907, Frame 0763.

II. RELATED APPEALS AND INTERFERENCES

Currently, it is believed there are no prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending Appeal.

III. STATUS OF CLAIMS

The status of the claims set forth in the Advisory Action mailed on July 16, 2008 was, and is, as follows:

Claims 11-18 and 20-28 are on appeal.

Claims 11-18 and 20-28 are pending.

Claims 11-18 and 20-28 are rejected.

Claims 1-10, 19 and 29 are canceled.

IV. STATUS OF AMENDMENTS

An amendment (after final), traversing the rejections of the Office Action that was mailed March 17, 2008, was received by the U.S. Patent and Trademark Office on May 19, 2008.

An Advisory Action indicating that the request for consideration has been considered and the amendments were entered but did not place the application in condition for allowance, was mailed by the U.S. Patent and Trademark Office on July 16, 2008.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present application is directed toward a method for improving the efficiency of the in-mold coating process by optimizing the injection location of in-mold coating process by optimizing the injection location of the in-mold coating and minimizing cure time.

Independent claim 11 recites: a method for optimizing the location of an in-mold coating injection port in a mold (page 19, lines 26-27) so as to minimize the flow time for an in-mold coating composition to flow over at least part of a molded article (page 19, line 29), the method comprising the steps of predicting a coating composition fill pattern in said mold (FIG. 16, page 20, lines 8-33, page 21, lines 1-16), using the pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article and to reduce the presence of surface defects of a coating formed from said in-mold coating composition (page 20, lines 1-6) and using the method in conjunction with a method to minimize a cure time in the mold coating composition. The step of predicting a coating composition fill pattern in the mold is performed by determining the relationship between a pressure in the mold and a flow rate of the coating composition by using a finite difference method (page 21, lines 17-19) comprising the steps of defining a fixed spatial step to track a flow front location of the in mold coating composition (page 21, lines 19-20), advancing the flow front location by one special step for fixed time increment (page 21, lines 20-21), obtaining the pressure and coating composition thickness distributions for said in mold coating (page 21, lines 21-23), and repeating the steps until the in mold coating composition is complete (page 21, lines 23-24).

Claim 15 is directed to the method of claim 11, wherein the steps of predicting a fill pattern and determining optimal placement of the nozzle are performed by a computer (page 23,

lines 18-19), and the data is provided to the computer by an instrument taking differential scanning calorimetry measurements (page 23, lines 22-24).

Claim 16 is directed to the method according to claim 15, wherein the data is stored in a data collection means associated with the instrument and then relayed to the computer (page 23, lines 26-27).

Independent claim 20 recites: a method for optimizing the location of an in-mold coating injection port in a mold (page 19, lines 26-27) so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article (page 19, line 29), the method comprising the steps of predicting a coating composition fill pattern in the mold over at least a two dimensional surface (page 22, lines 13-15), using the pattern to determine optimal placement of coating injection nozzle so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article and to reduce the presence of surface defects of a coating formed from the in-mold coating composition (page 20, lines 1-6), placing the injection nozzle in the optimal position and using the method in conjunction with a method to minimize a cure time of the in-mold coating composition. The step of predicting a coating composition fill pattern in the mold is performed by determining the following: a) the relationship between a fluidity, S, of an in mold coating composition and a pressure gradient present in said mold (page 23, lines 13-15, eq. (12), (13) and (21)), and b) the relationship between the coating thickness of the mold coating composition and injection pressure (page 23, lines 14-15, eq. (12), (13) and (20)).

Claim 21 is directed to the method according to claim 20, wherein a finite element method combined with a control volume approach can be used to numerically determine the relationships (page 23, lines 15-17).

Claim 22 is directed to the method according to claim 20, wherein the method is encompassed in instructions contained in a computer readable medium (page 24, lines 1-4).

Claim 23 is directed to the method according to claim 20, wherein the steps of predicting a fill pattern and determining optimal placement of the nozzle are performed by a computer (page 23, lines 18-20).

Claim 24 is directed to the method according to claim 23, wherein data necessary for performing said steps is input into the computer by a user (page 23, lines 22-24).

Claim 25 is directed to the method according to claim 23, wherein data necessary for performing said steps is automatically provided to the computer by an instrument taking differential scanning calorimetry measurements (page 23, lines 22-25).

Claim 26 is directed to the method according to claim 25, wherein the stat is stored in a data collection means associated with the instrument and then relayed to the computer (page 23, lines 25-28).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

Claims 20 and 27-29 are rejected under 35 U.S.C. §102(b) as being anticipated by Chen et al (In Mold Functional Coating of Thermoplastic Substrate: Process Modeling, Antec 2001, 255).

Claims 11-14 and 17-19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chen et al. in view of Ladeinde (A Procedure for Advection and Diffusion in Thin Cavities, Computational Mechanics 15 (1995) pp. 511-520, Springer-Verlag, 1995).

Claims 15-16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chen in view of Ladeinde as applied to claim 13 above, and further in view of Walsh (U.S. Patent 6,099,162).

Claim 21 is rejected under 35 U.S.C. §103(a) as being unpatentable over Chen as applied to claim 20 and further in view of Ladeinde.

Claims 22-24 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chen as applied to claim 20 and further in view of Zuyev (Optimizing Injection Gate Location and Cycle Time for the In-Mold Coating (IMC) Process, Antec 2001).

Claims 25-26 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chen in view of Zuyev as applied to claim 23 above, and further in view of Walsh (U.S. Patent 6,099,162).

VII. ARGUMENT

A. The Rejection of Claims 20 and 27-28 is Erroneous

Independent claim 20 is directed to a method for optimizing the location of an in-mold coating injection port in a mold so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article. The method entails predicting a coating composition fill pattern in a mold over at least a two dimensional surface, meaning that this particular method has been adapted for use with complex, multi-dimentional parts. The fill pattern is predicted by determining a) the relationship between a fluidity, S, of an in mold coating composition and a pressure gradient in the mold, and b) the relationship between the coating thickness of the mold coating composition and injection pressure. The fill pattern is used to determine optimal placement of a coating injection nozzle so as to minimize the flow time and reduce the presence of surface defects. This method is then used in conjunction with a method to minimize cure time of the in-mold coating composition. It is respectfully submitted that Chen does not disclose each and every limitation comprising independent claim 20.

Particularly, Chen fails to teach optimizing the location of an in-mold injection port to minimize the flow time for an in-mold composition to flow over at least part of a molded article. The Examiner asserts that the section in the subject application titled "Optimal Location of IMC Injection Port" (pg. 19-22) is almost identical to the section titled "Filling Stage" (pg. 2-3) from the Chen reference. (See Advisory Action, pg. 2) This leads the Examiner to the conclusion that Chen's "Filling Stage" must "inherit" the limitation of using the fill pattern to minimize optimal placement of a coating injection nozzle. This assumption is erroneous. The subject application states that predicting the fill pattern allows one to "locate the injection nozzle or nozzles in locations where the potential for surface defects in the appearance region of the part are

minimized while decreasing the time for complete flow coverage of the IMC over the thermoplastic substrate." (pg. 19, lines 27-30). The fact that Straus, the inventor of the subject application, contributed to the Chen reference does not support the conclusion that the Chen reference "inherits" all the properties of the present disclosure. In fact, Chen teaches of finding the fill pattern only to minimize the potential for trapping air. (page 2, column 1, paragraph 1). A simple mention of "fill pattern" in Chen does not necessarily mean that it is being used in the same or similar way to the invention of claim 20. The Examiner has failed to provide any support for the broad assumption that the fill pattern in Chen is being used to optimize the placement of a coating injection nozzle, and thus such an assumption is improper.

Moreover, Chen fails to teach of predicting a coating composition fill pattern in a mold over at least a <u>two-dimensional surface</u>. The Examiner argues that Chen discloses this limitation on page 2, col. 2, section "Filling Stage," wherein Chen states, "[f]or a simple rectangular part, the flow can be approximated as one dimensional." Contrary to the Examiner argument, this teaching does not read onto the claimed limitation. Chen specifically states that the flow is being approximated as one dimensional- not approximated as two-dimensional. The subject claim is directed to using a more realistic model for more complicated multi-dimensional geometry. Chen clearly states that such a feature is not within the current teaching.

In addition, the Examiner argues that Chen teaches a method to minimize the cure time with the statement, "[i]n order to optimize the process we need to develop mathematical models to predict...the fill pattern to minimize the potential for trapping air*;* and the cure time (cycle time)," (emphasis added). Appellant/Applicant respectfully disagrees that such a teaching reads on the subject claim. The statement simply acknowledges the need to predict the cure time. The Examiner appears to have read through the semi-colon in between "the fill pattern to minimize the potential for trapping air," and "the cure time." The presence of the semi-colon indicates that

the two mathematical models are separate and distinct. Chen does not read "the fill pattern to minimize the potential for trapping air and the cure time as the Examiner submits. Moreover, in the section "Curing Stage" on page 3, Chen describes the effect that injecting the IMC at different times in the cooling stage has on the cure time. At no point does Chen describe a method to lower the cure time in conjunction with a method for optimizing the location for an in-mold injection port.

Accordingly, for at least these reasons, Applicant/Appellant submits that the Examiner's rejection of claim 20 (along with claims 27-28 that depend therefrom) must be reversed.

B. *The Rejection of Claims 11-14 and 17-18 Must be Reversed*

Independent claim 11 is directed to a method for optimizing the location of an in-mold coating injection port in a mold so as to minimize the flow time for an in-mold coating composition to flow over at least part of a molded article. The method comprises predicting a coating composition fill pattern in said mold, using the pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article and to reduce the presence of surface defects, placing the injection nozzle in the optimal placement position and using the method in conjunction with a method to minimize a cure time of the in-mold coating composition. The step involving predicting a fill pattern is determined by the relationship between a pressure in the mold and a flow rate of the coating composition by using a finite difference method. It is respectfully submitted that Chen in view of Ladeinde fails to teach each of the limitations of independent claim 11 (as well as claims 12-14 and 17-18 that depend therefrom).

As discussed more thoroughly above in Section A, Chen does not teach a method for optimizing the location of an in-mold coating injection port in a mold so as to minimize the flow

time for an in-mold coating composition to flow over at least part of a molded article. In addition, and also consistent with the discussion above in Section A, Chen fails to teach of using the method for predicting fill pattern in conjunction with a method to minimize a cure time of the in-mold coating composition.

The Examiner further asserts that although Chen does not teach of using a finite difference method, Ladeinde teaches of using a finite difference method comprising the steps of a), b), c), and d) found in claim 11. (See Office Action of 03/17/2008). The Examiner has alleged that it would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Chen and Ladeinde since it would have applied in regions where this-cavity approximation does not hold and in which a full three-dimensional calculation is called for.

It is respectfully submitted that the combination of Chen and Ladeinde would not render the subject claim unpatentable. First of all, Ladeinde proposes a finite element method, which is a numerical technique for finding approximate <u>solutions</u> for differential equations. See Abstract. The subject application, on the other hand teaches of using the finite difference method, which is an approximation to the differential <u>equation</u>. Such methods are not the same and are used for very distinct purposes. The Examiner points to page 115, paragraph 1 for support; however, Ladeinde is referring to Subbiah's procedure, not the procedure subject to the paper. Specifically, page 514, last paragraph states, "[t]he need for the present approach could be put to question, since Subbiah et al. (1989) has somehow managed to solve the problem using finite difference. The motivation in our work comes from the general preference of the finite element method for structural problems and low Reynolds number flows…"

Moreover, the proposed combination of Ladeinde with the teachings of Chen is improper. The Examiner asserts the motivation to combine comes from the fact that it would have applied

in regions for which a thin cavity approximation does not hold and which a full three-dimensional calculation is called for. In addition to the fact that Ladeinde is referring to the finite element method rather than the finite difference method, Ladeinde also teaches away from using the finite difference method. The bottom line of page 514 and top of page 515 states, "...in spite of recent advances, it is still quite tedious using finite difference for the kinds of geometries involved in many of these applications." Therefore, it is clear that there is no motivation to combine the reference of Ladeinde and Chen.

For at least the foregoing reasons, it is respectfully submitted that claim 11 (along with claims 12-14 and 17-18 that depend therefrom), are patentable over Chen in view of Ladeinde. Applicant/Appellant respectfully requests reversal of this rejection.

C. Dependent Claims 15-16 and 21-26 Should be Allowed Due to Dependency on Claims 11and 20

Provided the Examiner's rejections of claims 11 and 20 are over turned, Applicant/Appellant submits that claims 15-16 and 21-26 are in condition for allowance because the claims depend from and contain all the limitations of either independent claim 11 or independent claim 20.

VIII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 11-18 and 20-28 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of claims 11-18 and 20-28.

Respectfully submitted,

Erik J. Overberger
Registration No. 48,556

EJO /amd
N:\OMNZ\200014\kat0000122V001.docx

FAY SHARPE LLP
1100 Superior Avenue – Seventh Floor
Cleveland, Ohio 44114-2579
Telephone: (216) 861-5582

Filed: October 14, 2008

APPENDICES

IX. CLAIMS APPENDIX

Claims involved in the Appeal are as follows:

Claims 1-10 (Cancelled)

11. (Previously Presented) A method for optimizing the location of an in-mold coating injection port in a mold so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article, said method comprising the steps of:

predicting a coating composition fill pattern in said mold;

using said pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article and to reduce the presence of surface defects of a coating formed from said in-mold coating composition;

placing said injection nozzle in said optimal placement position~~,~~; and

using said method in conjunction with a method to minimize a cure time of the in-mold coating composition;

wherein said step of predicting a coating composition fill pattern in said mold is performed by determining the relationship between a pressure in said mold and a flow rate of said coating composition by using a finite difference method comprising the steps of:

a) defining a fixed spatial step to track a flow front location of the in mold coating composition,

b) advancing the flow front location by one spatial step for a fixed time increment,

c) obtaining the pressure and coating composition thickness distributions for said in mold coating, and

d) repeating said steps until the in mold coating composition is complete.

12. (Previously Presented) The method according to claim 11, wherein said method is encompassed in instructions contained in a computer readable medium.

13. (Previously Presented) The method according to claim 11, wherein the steps of predicting a fill pattern and determining optimal placement of said nozzle are performed by a computer.

14. (Previously Presented) The method according to claim 13, wherein data necessary for performing said steps is input into said computer by a user.

15. (Previously Presented) The method according to claim 13, wherein data necessary for performing said steps is automatically provided to said computer by an instrument taking differential scanning calorimetry measurements.

16. (Previously Presented) The method according to claim 15, wherein said data is stored in a data collection means associated with said instrument and then relayed to said computer.

17. (Previously Presented) The method according to claim 11, wherein said process minimizes the potential for surface defects in an in mold coating formed on a surface of said molded article.

18. (Previously Presented) The method according to claim 11, wherein said method is used for an in-mold coating process including at least filling, packing, and solidification phases.

19. (Cancelled)

20. (Previously Presented) A method for optimizing the location of an in-mold coating injection port in a mold so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article, said method comprising the steps of:

predicting a coating composition fill pattern in said mold over at least a two dimensional surface;

using said pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article and to reduce the presence of surface defects of a coating formed from said in-mold coating composition;

placing said injection nozzle in said optimal placement position; and

using said method in conjunction with a method to minimize a cure time of the in-mold coating composition, wherein said step of predicting a coating composition fill pattern in said mold is performed by determining the following a) the relationship between a fluidity, S, of an in mold coating composition and a pressure gradient present in said mold, and b) the relationship between the coating thickness of the in mold coating composition and injection pressure.

21. (Previously Presented) The method according to claim 20, wherein a finite element method combined with a control volume approach can be used to numerically determine said relationships.

22. (Previously Presented) The method according to claim 20, wherein said method is encompassed in instructions contained in a computer readable medium.

23. (Previously Presented) The method according to claim 20, wherein said steps of predicting a fill pattern and determining optimal placement of said nozzle are performed by a computer.

24. (Previously Presented) The method according to claim 23, wherein data necessary for performing said steps is input into said computer by a user.

25. (Previously Presented) The method according to claim 23, wherein data necessary for performing said steps is automatically provided to said computer by an instrument taking differential scanning calorimetry measurements.

26. (Previously Presented) The method according to claims 25, wherein said stat is stored in a data collection means associated with said instrument and then relayed to said computer.

27. (Previously Presented) The method according to claim 10, wherein said process minimizes the potential for surface defects in an in mold coating formed on a surface of said molded article.

28. (Previously Presented) The method according to claim 20, wherein said method is used for an in-mold coating process including at least filling, packing, and solidification phases.

29. (Cancelled)

X. EVIDENCE APPENDIX

NONE

XI. RELATED PROCEEDINGS APPENDIX

NONE